

31. (Twice Amended) A method for controlling processing uniformity while processing a substrate using a plasma-enhanced process, comprising:

providing a plasma processing chamber having a single chamber, substantially azimuthally symmetric configuration within which a plasma is both ignited and sustained during said processing of said substrate, said plasma processing chamber having no separate plasma generation chamber;

providing a coupling window disposed at an upper end of said plasma processing chamber;

providing an RF antenna arrangement disposed above a plane defined by said substrate when said substrate is disposed within said plasma processing chamber for said processing;

providing an electromagnet arrangement disposed above said plane defined by said substrate, said electromagnet arrangement being configured so as to result in a radial variation in the controlled magnetic field within said plasma processing chamber in the region proximate to said coupling window and antenna when at least one direct current is supplied to said electromagnet arrangement, said radial variation being effective to affect density of said plasma in said region proximate to said coupling window and antenna;

providing a dc power supply coupled to said electromagnet arrangement;

placing said substrate into said plasma processing chamber;

flowing reactant gases into said plasma processing chamber, said reactant gases include a combination of gases, wherein two or more gases of said combination of gases included in said reactant gases is a $C_x F_y H_z O_w$ gas;

striking said plasma out of said reactant gases; and

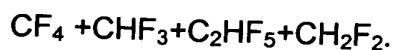
changing said radial variation in said controlled magnetic field within said plasma processing chamber in said region proximate to said antenna to control said density of said plasma when said reactant gases are being flown in said plasma processing and thereby improving processing uniformity across said substrate chamber.

32. The method of claim 31 wherein the reactant gases further include one or more gases selected from a group of gases consisting of O_2 , N_2 , CO , CO_2 , SF_6 , NF_3 , NH_3 , Cl_2 and HBr .

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33. (Once Amended) The method of claim 32 herein the reactant gases further include one or more gases selected from a group of gases consisting of He, Ne, Ar, Kr and Xe.
34. (Once Amended) The method of claim 31 wherein the reactant gases further include one or more gases selected from a group of gases consisting of He, Ne, Ar, Kr and Xe.
35. (Once Amended) The method of claim 31 wherein the reactant gases include a gas that is selected from a group of gases consisting of C_5F_8 , C_4F_8 , C_4F_6 , C_3F_6 , C_2F_6 and CF_4 .
36. (Once Amended) The method of claim 31 wherein the reactant gases include a gas that is selected from a group of gases consisting of C_2HF_8 , C_2HF_5 , CHF_3 , $C_2H_2F_2$, $C_2H_2F_4$ and CH_2F_2 .
37. (Once Amended) The method of claim 31 wherein the reactant gases include a gas that is selected from a group of gases consisting of:
- $C_5F_8 + CF_4 + CHF_3 + CH_2F_2$;
 - $C_4F_8 + CF_4 + CHF_3 + CH_2F_2$;
 - $C_4F_6 + CF_4 + CHF_3 + CH_2F_2$;
 - $C_3F_6 + CF_4 + CHF_3 + CH_2F_2$;
 - $C_2F_6 + CF_4 + CHF_3 + CH_2F_2$;
 - $C_2HF_5 + CF_4 + CHF_3 + CH_2F_2$;
 - $C_5F_8 + CF_4 + CHF_3 + C_2H_2F_4$;
 - $C_4F_8 + CF_4 + CHF_3 + C_2H_2F_4$;
 - $C_4F_6 + CF_4 + CHF_3 + C_2H_2F_4$;
 - $C_3F_6 + CF_4 + CHF_3 + C_2H_2F_4$;
 - $C_2F_6 + CF_4 + CHF_3 + C_2H_2F_4$;
 - $C_2HF_5 + CF_4 + CHF_3 + C_2H_2F_4$;
 - $C_5F_8 + CHF_3 + C_2HF_5 + CH_2F_2$;
 - $C_4F_8 + CHF_3 + C_2HF_5 + CH_2F_2$;
 - $C_4F_6 + CHF_3 + C_2HF_5 + CH_2F_2$;
 - $C_3F_6 + CHF_3 + C_2HF_5 + CH_2F_2$;
 - $C_2F_6 + CHF_3 + C_2HF_5 + CH_2F_2$; and

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38. The method of claim 37 wherein the reactant gases further include one or more gases selected from a group of gases consisting of O_2 , N_2 , CO , CO_2 and SF_6 .
39. The method of claim 38, wherein the reactant gases further include one or more gases selected from a group of gases consisting of He , Ne , Ar , Kr and Xe .
40. The method of claim 37, wherein the reactant gases further include one or more gases selected from a group of gases consisting of O_2 , N_2 , CO , CO_2 , NF_3 , NH_3 , Cl_2 or HBr and SF_6 .
41. The method of claim 37, wherein the reactant gases further include one or more gases selected from a group of gases consisting of He , Ne , Ar , Kr and Xe .
42. The method of claim 31 wherein said plasma processing chamber includes an inner surface and at least the inner surface of the plasma processing chamber is made of a material that does not substantially interact with reactive gas chemistries that are flown into said plasma processing chamber.
43. The plasma processing system of claim 42 wherein said material of said plasma processing chamber is selected from a group of materials consisting of silicon carbide, quartz, silicon, silicon dioxide, carbon, boron carbide, and boron nitride.
44. The method of claim 31, wherein said plasma processing chamber includes silicon carbide.
45. The method of claim 31 wherein said plasma processing chamber is made entirely of silicon carbide.
49. (New) The method as recited in claim 31, wherein said plasma processing chamber includes an inner surface and at least said inner surface of the plasma processing chamber is made of a material that does not substantially interact with reactive gas chemistries that are flown into said plasma processing chamber.

50. (New) The method as recited in claim 49, wherein said material of said plasma processing chamber is selected from a group of materials consisting of silicon carbide, quartz, silicon, silicon dioxide, carbon, boron carbide, and boron nitride.
51. (New) The method as recited in claim 49, wherein said material of said plasma processing chamber is silicon carbide.
52. (New) The method as recited in claim 51, wherein the silicon carbide of said plasma processing chamber is selected from a group of materials consisting of Chemical Vapor Deposition (CVD), Slipcast Forming, hot-pressed and sintered, iso-statically-pressed and sintered formed silicon carbide.
53. (New) The method as recited in claim 49, wherein material forming said inner surface of said plasma processing chamber is provided by a bonded assembly consisting of a suitable material bonded to the chamber wall.
54. (New) The method as recited in claim 53, wherein said bonded assembly is bonded with an electrically conductive or a thermally conductive adhesive.
55. (New) The method as recited in claim 53, wherein said bonded assembly is configured to reliably form a significant part of the plasma ground.
56. (New) The method as recited in claim 53, wherein said bonded assembly is comprised of several segments or tiles of said suitable material bonded to the chamber wall.